Hurricane Ike Deposits on the Bolivar Peninsula, Galveston Bay, Texas

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In September 2008, Hurricane Ike made landfall on Galveston Bay, close to the NASA Johnson Space Center (JSC). The storm flooded much of the area with a storm surge ranging from 11-20 feet. The Bolivar peninsula, the southeastern coast of Galveston Bay, experienced the brunt of the surge. Several agencies collected excellent imagery baselines before the storm and complementary data a few days afterward that helped define the impacts of the storm.

In April of 2011, a team of scientists and astronauts from JSC conducted field mapping exercises along the Bolivar Peninsula, the section of the Galveston Bay coast most impacted by the storm. Astronauts routinely observe and document coastal changes from orbit aboard the International Space Station. As part of their basic Earth Science training, scientists at the Johnson Space Center take astronauts out for field mapping exercises so that they can better recognize and understand features and processes that they will later observe from the International Space Station.

Using pre-storm baseline images of the Bolivar Peninsula near Rollover Pass and Gilchrist (NOAA/Google Earth Imagery and USGS aerial imagery and lidar data), the astronauts mapped current coastline positions at defined locations, and related their findings to specific coastal characteristics, including channel, jetties, and other developments. In addition to mapping, we dug trenches along both the Gulf of Mexico coast as well as the Galveston Bay coast of the Bolivar peninsula to determine the depth of the scouring from the storm on the Gulf side, and the amount of deposition of the storm surge deposits on the Bay side of the peninsula. The storm signature was easy to identify by sharp sediment transitions and, in the case of storm deposits, a layer of storm debris (roof shingles, PVC pipes, etc) and black, organic rich layers containing buried sea grasses in areas that were marshes before the storm. The amount of deposition was generally about 20-25 cm; the local areas experiencing obvious deposition are readily obvious in post-Ike imagery of the region. We used a March 2010 aerial photograph from the NOAA-Google Earth collection because construction and vegetation recovery was minimal. Based on the before and after aerial imagery and the trenching data collected over two days, we can begin to characterize the material transported and deposited by Hurricane Ike along one stretch of the Bolivar peninsula.

We summarize the results from our mapping and trenching data. The basic data collected 2.5 years after the storm are ephemeral as the storm deposits become reworked and overprinted by coastal processes, vegetation regrowth and reconstruction.